



## Energy Forecasting and Modelling

While the global marketplace becomes increasingly volatile, our **energy forecasting and modelling services** do the exact opposite. We provide you with stability and prepare you for the future through reliable energy predictions.

Combining our globally recognized models (POLES and MedPro) with over 30 years of expertise in forecasting, our modelling specialists can provide unique insight on long-term energy demand, prices, power mix, GHG mitigation and energy efficiency, taking into account the latest geo-strategic developments. **Enerdata** also participates in numerous research programmes to determine long-term energy scenarios in the global economy.

Our clients include major global energy companies, equipment manufacturers, industries and governmental bodies.

### Our Services Include:

- EnerFuture Energy Forecasts
- Special Foresight Reports on key energy markets
- Global Energy Research on the local energy market
- Custom and on-site training seminars on forecasting
- On-demand consulting services

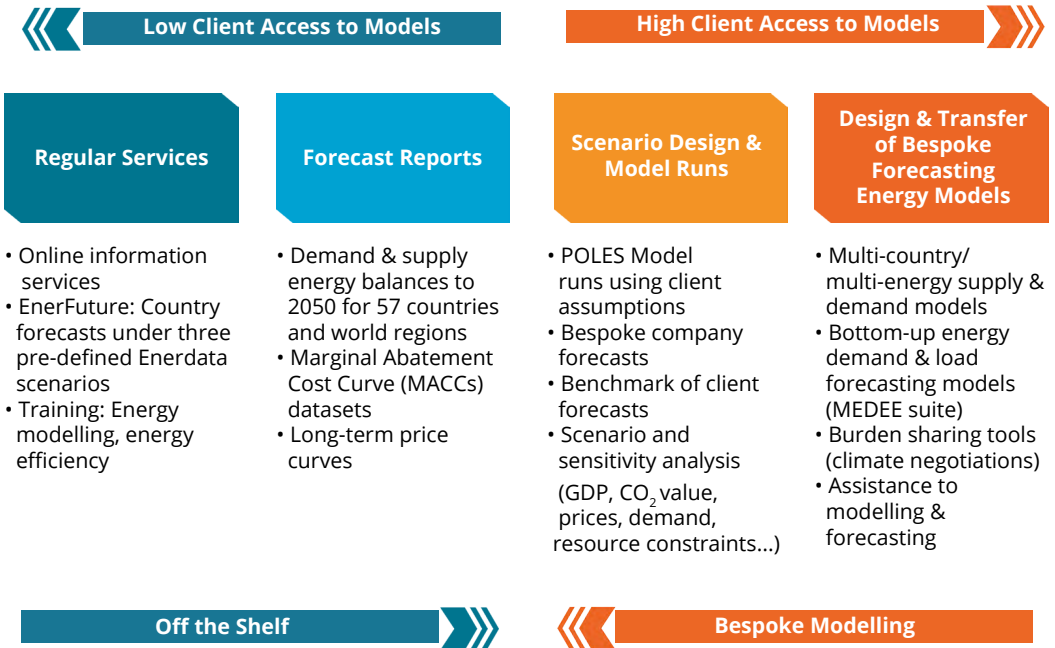
# Enerdata Collaborative Consulting Services

A private and independent company since 1991, Enerdata advises international organisations, governments, oil and gas companies, utilities and OEMs on key matters such as energy demand and supply, energy efficiency, technology developments and energy or climate change policy scenarios.

Enerdata uses several global energy modelling tools for simulation and forecasting work as well as qualitative scenario building and market research techniques.

These models have been used to benefit international organisations (the European Union, International Atomic Energy Agency, World Energy Council, World Bank, UNDP and the African Development Bank), national governments (France, UK, Denmark, Belgium, Spain, Canada) and numerous multinational energy firms.

Enerdata has been largely involved in the development and evaluation of public climate change mitigation policies as well as developing relevant and cost-effective energy and carbon strategies in the private sector. Enerdata also carries out ongoing evaluation of energy efficiency policies at world level.



# Our Models and Tools

## POLES

- POLES is a world simulation model for the energy sector, 57 countries/regions, annual step throughout 2050
- Techno-economic model with endogenous projection of energy prices
- Complete accounting of energy demand and supply of numerous energy vectors, associated technologies and greenhouse gas emissions
- Developed for over 20 years, used by the European Commission in its internal exercise

## InsularSys Power Forecast

- Provides power demand and load forecasts for islands and electrically autonomous regions, annual step throughout 2030
- Inspired from the MEDEE Models, benefits from its strong experience and is adapted to client's needs and the region studied
- The finalised tool is transferred to the client with training and reference scenarios
- Used in particular by EDF on all French island territories

## Emission Reduction Assessment

- Identify technological options that will develop under a carbon price (or emissions cap)
- Final tool can be transferred to the client with training and scenarios
- Used by private companies to highlight market opportunities and by governments to analyse Nationally Appropriate Mitigation Actions (NAMAs)

## MedPro/MedLoad

- Developed in the 1970s from the MEDEE suite with an emphasis on electricity load curves and greenhouse gases
- Detailed bottom-up country level demand model with focus on energy efficiency & technological improvement
- The dedicated MedPro software is transferred to the client with model training and maintenance
- Applied in governments and utilities around the world for over four decades

## Gas & Power Demand Model

- Detailed sectoral country-level demand model, annual step throughout 2040
- Inter-fuel competition based on costs and policies, with a focus on power and gas demand
- Optional power generation module with generation allocation by technology
- Updated annually since 2008
- Used in particular by private power utilities for internal forecasts

## Carbon Market Tools

- Analytical Excel tools that allow simulating future carbon markets through the equalisation of Marginal Abatement Costs in the energy sector
- The user can design his or her own carbon markets (regional/sectoral coverage, commitments, limitations on CDM/JI, funding mechanisms...)
- This tool produces market prices, imports/exports by actor, domestic abatement costs, trading costs...

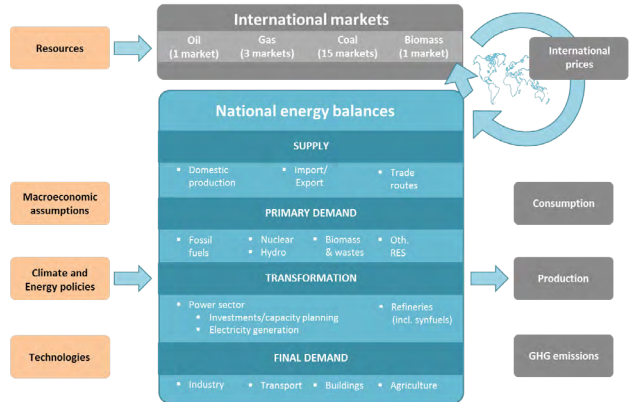
# The POLES Model

POLES is a world-class forecasting model jointly developed by Enerdata, the European Commission and the CNRS Research Centre. It is currently used by major governmental bodies and energy companies worldwide to accurately predict annual energy balances forecast for 65 countries and regions up to the year 2050 (-2100).

This model is ideal for global business planning and policy making at energy companies and agencies as well as large governmental bodies.

## Main Features of the POLES Model:

- Projections of demand & supply by country and commodity up to 2050 (-2100)
- Simulation of future technology developments in the energy sector
- Projection of international oil, gas and coal prices and end-user prices (including power)
- Simulation of GHG emissions (all Kyoto gases), analysis of GHG abatement strategies, impacts on energy markets
- Continuous development efforts



## Main Features of the POLES Model:

- ✓ Yearly dynamic recursive, includes anticipation behaviours
- ✓ Simulation of energy balances for 57 countries/regions
- ✓ Disaggregation into 15 energy demand sectors, 50 technologies (power generation, buildings, transport) and technological learning
- ✓ Simulation of oil and gas supply (80 countries)
- ✓ Full power generation system (and feedback effect on other energies)
- ✓ Uranium and renewable resources, associated land-use
- ✓ International energy prices and markets (oil, gas, coal)

# Key Issues Covered with POLES

## Final Demand

The POLES Model provides accurate forecasts of future energy demand taking into account the rising number of regulations on energy efficiency as well as the growing demand in emerging economies. Our model will help you to quantify future energy demand by country and by energy to assess the effects of specific policies and measures on energy efficiency.

## Power Sector

Investors in the power sector are more and more exposed to uncertainties: very dynamic trends for renewable energies with important support policies, strong volatility of fossil fuel prices, growing carbon constraints and the phasing-out of nuclear in some countries. Enerdata's analysts better understand these risks with POLES Model Global Outlooks including the identification of market opportunities for new technologies, assessment of the role of support schemes and taxations and the role of specific technologies in mitigation policies...

## Oil and Gas Supply

Over the last 10 years, fossil fuel supply encountered some great shifts: from a high volatility of market prices to unconventional fuel emergence in North America. Benefiting from a complete modelling of oil and gas supply and prices, our consulting team provides you with forecasts on the evolution of oil and gas markets: impacts of resource scarcity, production levels, costs of unconventional oil and gas, future gas trades and the role of LNG...

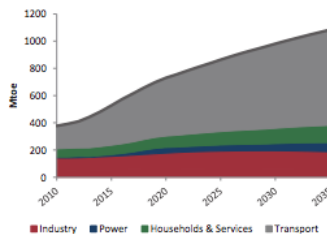
## Case Study

**Client:** Leading European Oil Company

**Issue:** Putting together an Energy Outlook to support business planning

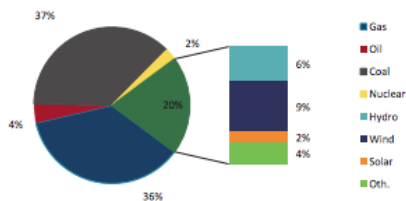
**Solution:** Enerdata developed a tailored baseline and reference scenario. The baseline scenario included data on population and GDP growth and calibrated of oil production profiles according to several assumptions (e.g. availability of electric cars, development of natural gas trucks etc). It also took into consideration the implications of further generation of electricity through nuclear power plants. The reference scenario was based on climate policies.

Evolution of liquid fuel demand in China



Source: Enerdata, EnerFuture scenario

Japan, Power Generation Mix in 2035

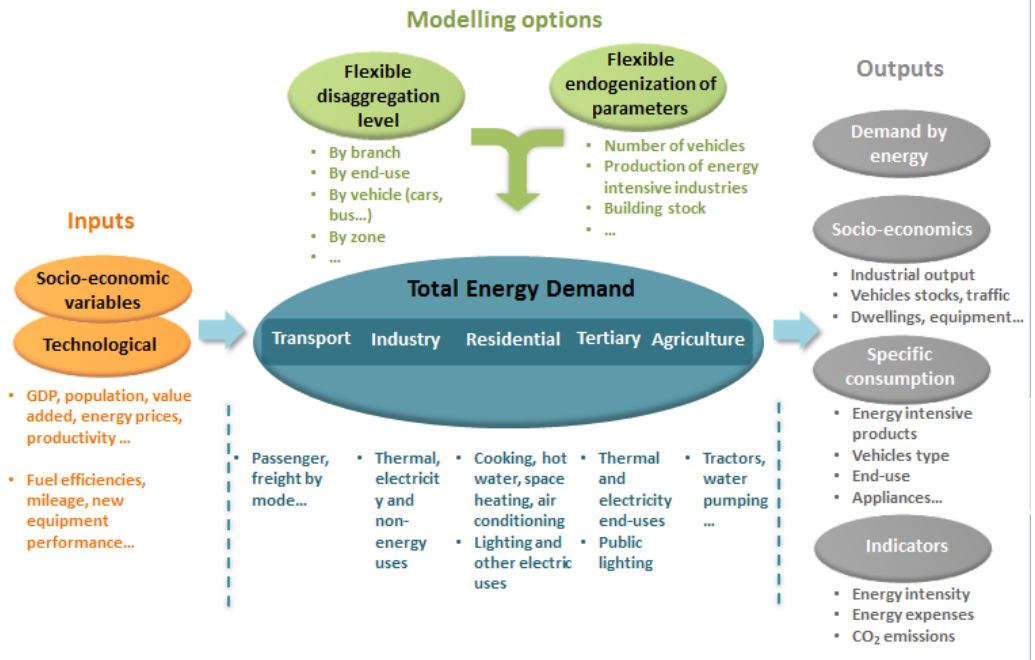


Map of oil production in 2035



# MedPro

MedPro is a bottom-up simulation model used for long-term energy demand, load curve and GHG emissions forecasts by product and end use. Applied in 60 countries worldwide, it is the most ideal tool for policy making.



MedPro and POLES are often jointly used to provide detailed energy demand forecasts and projections of energy supply: power mix, fossil fuel productions...

# VLEEM

This model has been designed as part of an EU research project to support R&D policy decisions in the energy field in relation with long-term sustainability objectives. Addressing energy and environment issues over one century, VLEEM fills the gap in the existing energy models which are designed and is calibrated to address much shorter time horizons.

# Ways and Means to Carbon Markets

Enerdata develops and operates the Carbon Market Tool for a detailed analysis of carbon markets. Using main inputs from Marginal Abatement Cost Curves produced by the POLES Model, this tool allows you to integrate multiple features affecting carbon markets:

- ✓ CDM credits, hot air management, limitations on credits trading, ceilings on credit purchases, taxation of credits traded, inclusion of sectors (e.g. international aviation)...
- ✓ Possibility to include exogenous datasets (land-use/forestry)
- ✓ CO<sub>2</sub> only or multi-GHG configuration
- ✓ Various time horizons (standard: 2020, 2030,2050)

The Carbon Market Tool can either be run by Enerdata's experts to produce detailed analyses or transferred with support to the client. It provides useful forecasts on emissions reductions by sector, market prices, carbon trades and financing flows.

## This Series of Tools is Valuable for:



Actors exposed to carbon markets



Investors looking for new markets



Assessing cost-efficient policies at national level: policies to promote, technologies in order to develop



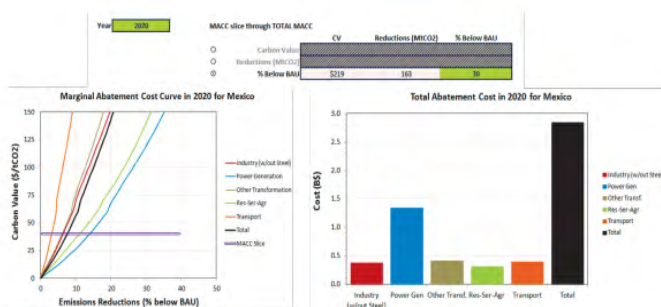
Quantifying the sensitivity of future investments to carbon taxation



Identifying new market opportunities and their sensitivity to carbon regulation

## Emission Reduction Assessment Model

In response to the rise of carbon policies and low emitting investments in developing countries (CDMs, NAMAs), Enerdata has developed the **Emission Reduction Assessment Model**. This tool provides the emission reduction options and the associated costs which develop in a country under different energy and climate policies.



## About Enerdata

Enerdata is an energy intelligence and consulting company. Our experts will help you to tackle key energy and climate issues and make sound strategic and business decisions. We provide research, solutions, consulting and training to key energy actors worldwide.

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# Enerdata

## Enerdata Clients Include:



## Enerdata Information Services

**Global Energy & CO<sub>2</sub> Data:** Regularly updated global energy market database providing supply, demand & prices for all energy sources by sector and GHG emissions covering 186 countries from 1970 onwards.

**Global Energy Research:** More than 110 country reports. Daily news feed included.

**EnerFuture:** Annual forecasts until 2040 for energy demand & prices for all energy sources & CO<sub>2</sub> emissions by sector. Power generation forecasts by fuel source are also included. Energy forecasts are based on the globally recognised POLES model.

**EnerFuture MACCs:** Assess climate policies, evaluate cost and efficiency, and simulate carbon markets with our CO<sub>2</sub> Marginal Abatement Cost Curves tool.

**Odyssee:** Unique government data on energy consumption by end-use for 28+ EU members from 1990 until 2012. Exclusive energy efficiency indicators.

**Country Energy Demand Forecasts:** Energy demand forecasts of oil, gas, coal and power consumption by country, by sector and by usages up to 2030.

**Power Plant Tracker:** Screen, monitor and analyse the development of power generation assets. Includes powerful embedded analytics.

**World Refinery Database:** New and existing refineries monitoring.

**World LNG Database:** All key information and data about world LNG markets.

**Key Energy News:** Search by energy topic, energy source (electricity, natural gas, oil, CO<sub>2</sub> emissions, coal, biofuels and heat) or utility company (44 utilities included).